

PROGRESS REPORT OF THE PARTIES NUTRIENTS ANNEX CHAPTER

OVERVIEW

Excessive nutrients entering the Great Lakes are one of the primary causes of the development of algal blooms, which can be harmful to human health and the environment. Of all the lakes, Lake Erie in particular has been experiencing increasing algal growth since the 1990s.

Algal bloom image



Through the Nutrients Annex of the 2012 GLWQA, Canada and the United States commit to coordinating binational actions to manage phosphorus concentrations and loadings in the Waters of the Great Lakes. The focus of the implementation of the commitments from the Nutrients Annex over the first three years is the completion of revised binational phosphorus reduction targets for Lake Erie and work with others to manage phosphorus concentrations and loadings in Lake Erie as a means of reducing excessive algal growth.

Water quality is in fair condition and is deteriorating. Trends in harmful and nuisance algae are worsening in nearshore areas and are impacting human and ecosystem health. Increasing water clarity is accelerating the proliferation of nuisance algae along some shorelines and signifies a lack of food for fish offshore. Low oxygen levels in the central Lake Erie basin are causing seasonal “dead zones” for aquatic life. [To be updated w/ SOGL 2015 info]

ACTIONS TAKEN TO MEET KEY COMMITMENTS

The following Priorities for Science and Action were established to focus efforts on the key commitments from the 2012 GLWQA’s Nutrients Annex that required action in the first three years (Table x).

Table x – Binational Priorities for Science and Action and Key Commitments

NATIONAL PRIORITIES FOR SCIENCE		KEY COMMITMENTS
BINATIONAL ACTION	<ul style="list-style-type: none"> • Undertake science to support the establishment of phosphorus concentration objectives, loading targets and loading allocations. • Identify sources of phosphorus and priority watersheds for action. • Improve understanding of how aquatic invasive species, lake dynamics, climate change and other factors affect phosphorus concentrations and algae growth. • Improve monitoring techniques and approaches to enable tracking progress towards objectives. <ul style="list-style-type: none"> • By 2016, update the 1987 offshore phosphorus concentration objectives for Lake Erie and develop new nearshore phosphorus concentration objectives. • By 2016, determine the phosphorus loading targets for Lake Erie, apportioned by country, required to achieve the above phosphorus objectives. • Assess the effectiveness of current programs and practices to manage phosphorus inputs to Lake Erie. • Develop and implement phosphorus reduction strategies and domestic action plans to ensure measures to manage phosphorus produce maximum results. 	<ul style="list-style-type: none"> • By 2016, develop binational substance objectives for phosphorus concentrations, loading targets, and loading allocations for Lake Erie. • By 2018, develop binational phosphorus reduction strategies and domestic action plans to meet the objectives for phosphorus concentrations and loading targets in Lake Erie. • Assess, develop, and implement programs to reduce phosphorus loadings from urban, rural, industrial and agricultural sources. This will include proven best management practices, along with new approaches and technologies. • Identify priority watersheds that contribute significantly to local algae development, and develop and implement management plans to achieve phosphorus load reduction targets and controls. • Undertake and share research, monitoring and modeling necessary to establish, report on and assess the management of phosphorus and other nutrients and improve the understanding of relevant issues associated with nutrients and excessive algal blooms.

Binational Actions Taken

The primary action taken in support of these commitments was the establishment of revised binational

phosphorus loading targets for Lake Erie. In the first three years, Canada and the United States worked collaboratively and in consultation with stakeholders to conduct a comprehensive science-based assessment of the phosphorus reductions needed to meet the Lake Ecosystem Objective for Lake Erie, and reach consensus on new phosphorus limits for the Lake. Canada and the United States agreed that significant reductions in phosphorus are needed to combat Western basin algal blooms and Central basin hypoxia – when oxygen concentrations fall below the level necessary to sustain most animal life primarily through the decomposition of organic material. Specifically, Canada and the United States agreed to reduce phosphorus loading to the Western and Central basins by forty percent. A new target load of 6,000 metric tons annually was allocated [insert amount once final] Canada and [insert amount once final] the United States. This load is expected to raise the dissolved oxygen levels in the bottom waters of the Central basin to 2 mg/L. Canada and the United States also identified priority watersheds for phosphorus control to address algal blooms occurring in the nearshore zones of Lake Erie. Finally, because the modeling showed that spring loading of phosphorus from the Maumee River in Ohio is the determining factor in the production of cyanobacteria in the Western basin, specific seasonal targets were identified for the Maumee River. A forty percent reduction Maumee spring phosphorus loads is expected to lower cyanobacteria biomass in the Western basin to mild levels in 9 years out of 10.

In the summer of 2015, Canada and the United States held engagement sessions on the recommended binational phosphorus load reduction targets to combat Lake Erie algal blooms. These engagement sessions included a webinar, a fact sheet and technical report posted on www.binational.net, www.nutrientsbinational.net, and [US pg?] to solicit public comments, as well as meeting with specific interest groups – the agricultural sector; Conservation Authorities; environmental groups; municipalities; First Nation representatives ... [others? US specific mtgs?] – regarding the Lake Erie phosphorus reduction recommendations.

The revised phosphorus targets, summarized in Table x, were ratified by Canada and the United States in February 2016 after vetting with the public. These targets address all but one of the Lake Ecosystem Objectives identified in the Agreement. More work is needed to address the second Lake Ecosystem Objective, “Maintain the levels of algae below the level constituting a nuisance condition,” which is of particular importance in the Eastern basin of Lake Erie, and in other parts of the Great Lakes. While models were used to explore the impact of phosphorus reduction on nuisance algae (*Cladophora*) growth in the Eastern basin, the confidence in the model predictions is not adequate to recommend a specific target at this time. Additional research is required to link phosphorus loadings to changes in algal production prior to recommending phosphorus reduction targets to address *Cladophora*.

Table x - Binational Phosphorus Load Reduction Targets

Lake Ecosystem Objectives (as outlined in Annex 4 Section B of the 2012 GLWQA)	Western Basin of Lake Erie	Central Basin of Lake Erie
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	40 percent reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada – to achieve 6000 MT Central Basin load	
Maintain algal species consistent with healthy aquatic ecosystems in the nearshore	40 percent reduction in spring total and soluble reactive phosphorus loads from the following watersheds where	

Waters of the Great Lakes	localized algae is a problem:	
	Thames River - Canada Maumee River - U.S. River Raisin - U.S. Portage River - U.S. Toussaint Creek - U.S. Leamington Tributaries - Canada	Sandusky River - U.S. Huron River, OH - U.S.
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 percent reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A

While in general there was strong public support for these targets, stakeholders expressed valid concerns with the lack of a phosphorus target to address nuisance *Cladophora* in the Eastern basin of Lake Erie. Canada and the United States are committed to continue supporting research, monitoring and modeling efforts that will improve our scientific understanding of *Cladophora* growth and propose further phosphorus reductions to ameliorate nuisance algae impacts in the Eastern basin, if warranted. Recent actions toward this goal include:

- The Nutrients Annex Subcommittee worked with the Science Annex Subcommittee to convene a workshop on the state of the science of *Cladophora* in early 2016. The results of this workshop ...
- Environment Canada research expected to wrap up march 2016
- The US and Canada formed a new workgroup with representatives from EPA, EC, NYSDEC, OMOEE, OMNRF, and USGS to initiate nutrient target development in Lake Ontario. The group will start by examining current trends and data gaps particularly with respect to nearshore *Cladophora* growth as a response to nutrient levels in Lake Ontario.

Binational strategy {expected draft in Feb 2016}

Canada and the United States prepared a binational strategy for implementation of the Lake Erie phosphorus reductions moving forward. The strategy identifies binational priorities for research and monitoring, with a focus on coordinating our efforts to track progress through an active adaptive management process.

Finally, Canada and the United States have begun work to develop domestic action plans and anticipate releasing draft action plans by the end of 2016. These plans will outline in more detail the specific implementation strategies needed to achieve the 40% reductions.

In addition to binational actions taken by Canada and the United States, each country has taken numerous domestic actions in support of the key commitments of the Nutrients Annex. Table x and Table x briefly outline some examples of these domestic actions.

Table x – Domestic Canadian Actions Taken

Environment Canada's Great Lakes Nutrient Initiative	Under the Great Lakes Nutrient Initiative, Canada undertook new science in support of the development of the binational phosphorus reduction targets and development of the phosphorus reduction strategies and action plans. This new science included monitoring to determine the contribution of phosphorus to Lake Erie from Canadian sources, research to understand the factors contributing to excessive algae development in the lake, and modeling to predict the levels of phosphorus reductions required to reduce or eliminate the excessive algae development problem.
Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health, 2014	[GLNI interagency policy options work to support the development of Canadian domestic action plan for Lake Erie begins (through COA)]
Environment Canada's Lake Simcoe/ South-eastern Georgian Bay Clean Up Fund	[Insert # of related projects over 3yr?] Community-based projects that demonstrate on-the-ground actions to reduce phosphorus discharges from urban and rural sources, protect and create aquatic habitat, and enhance research and monitoring for decision making were supported through annual funding from the Lake Simcoe/South-eastern Georgian Bay Clean Up Fund.
Agriculture and Agri-Food Canada's Growing Forward 2	Through Growing Forward 2, Agriculture and Agri-Food Canada collaborating with the Province of Ontario on a cost-shared basis, continue to work with, and support, producers to assess the environmental risks and benefits on their farm, provide them with tools to identify practices, and develop an action plan that can reduce environmental risks on their farm. These practices include soil nutrient testing, minimizing nutrient applications, and planting buffer strips along waterways, supporting the reduction of the loss of nutrients into the Great Lakes and its tributaries.
Great Lakes Agricultural Stewardship Initiative	The governments of Canada and Ontario continue to support farmers through cost-shared funding of the Great Lakes Agricultural Stewardship Initiative, a part of Growing Forward 2, in order to improve soil health and promote environmental stewardship targeted in the Lake Erie basin and the southeast shores of Lake Huron.
	[Health Canada – microcystin guidelines]
	[Ontario's entering into the Western Basin of Lake Erie Collaborative Agreement (with Michigan and Ohio), as well as the Great Lakes Commission's Lake Erie Nutrient Targets Working Group]
Grand River Watershed Management Plan	[Grand River watershed management plan and associated efforts; development of Thames River watershed management plan]

Table x – Domestic U.S. Actions Taken

	[start of domestic action plans]
	[domestic program efforts to address nutrients]